

DIO136

Digital Input/Output Module

Reliable acquisition of digital sensor signals and precise switching of binary-controlled actuators form the foundation of numerous automation tasks. DIO136 combines 20 digital inputs and 16 freely configurable inputs/outputs in a compact module. It combines high channel density and flexibility with exceptional robustness and proven Bachmann quality. This makes it the ideal interface between the field and control levels for modern automation solutions.

Features

- 36-channel digital input/output module
- Input interface according to IEC 61131-2 type 1/3
- Output interface according to IEC 61131-2 type 0.5
- 1-wire connection
- Time stamp / synchronous clocks
- Configurable digital pulse filter
- Signal inversion
- Integrated counter function
- Pulse extension
- Oversampling
- Direct module-to-module communication

Part type designation	Part number
DIO136	00047157-00
DIO136 EC	00047159-00

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Common properties	
Basic function	20x digital input 24 V DC type 1/3 standard (sink) 16x digital input 24 V DC type 1/3 standard (sink) / output 24 V DC type 0.5 standard (source) 4x counter function 4x time stamp 4x pulse extension 4x oversampling 8x module-to-module communication
System	Bachmann system M100
Digital Inputs – 24 V	
Number of digital inputs	20 + 16 (configurable)
Signal standard	IEC 61131-2 type 1/3 sink (P-reading)
Voltage category, nominal	24 V DC
Signals per supply group	36 (1 group)
Connections per input	1 (signal)
Signal supply voltage range	18 V DC to 32 V DC
Operating voltage range (high/on)	11 V DC to 32 V DC
Off-state voltage (low/off)	-32 V DC to +5 V DC
Overvoltage protection	-32 V DC to +32 V DC
Input current, on-state, nominal	Channel 1-20: 2.3 mA Channel 21-36: 2.8 mA
Input current, off-state, max.	1.6 mA
Signal on delay, max.	Channel 1-20: 3 µs + digital pulse filter setting time Channel 21-36: TBD
Signal off delay, max.	Channel 1-20: 3 µs + digital pulse filter setting time (when the input is actively discharged) 12 µs + digital pulse filter setting time (without active discharge) Channel 21-36: TBD
Digital spike filter	0 µs, 10 µs to 500 ms in 15 increments
Internal scan rate, max.	No internal cycle
Maximum input frequency	Channel 1-20: 100 kHz (when the input is actively discharged) 30 kHz (without active discharge) Channel 21-36: TBD
Signal inversion	36x
Impulse extension	Up to 1 s (4x)
Oversampling	Up to 128 values per cycle (4x)
Time stamps	Rising/falling edge (4x)
Signal state indication	Yes, green numeric LED per channel
Signal cable length, shielded, max.	1000 m
Signal cable length, unshielded, max.	600 m

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Digital outputs – 24 V	
Number of digital outputs	16 configurable
Signal standard	IEC 61131-2 type 0.5 source (HighSide, P-switching)
Voltage category, nominal	24 V DC
Output type	Semiconductor
Signals per supply group	Group 1: CH21-36 type 0.5
Signal supply voltage range	18 V DC to 32 V DC
Overvoltage protection	-11 V DC [1] to 32 V DC
Connections per output	1 (DO)
Output current per channel, nominal, continuous	0.5 A (16x)
Output current per channel, max.	0.7 A (8 A max. per group)
Output current per channel, short-term overload	1.3 A (typical, thermal overload protection) (16x)
Output current per group, max.	8A
Output current per channel, min.	0 mA
Output current per channel, off-state, max.	5 µA
Paralleling outputs	No
Coupled outputs	0
Voltage drop, on-state, max.	162.5 mV @ 0.5 A
Output impedance, on-state, max.	325 mΩ
Signal on delay, max.	22 µs (typ.), 50 µs (max.)
Signal off delay, max.	32 µs (typ.), 80 µs (max.) [2]
Internal scan rate, max.	30 kHz
Maximum output frequency [3]	5 kHz @ 0.5 A, T_a = 60 °C (resistive load) 5 kHz @ 0.25 A, T_a = 70 °C (resistive load) 1 Hz @ 0.5 A, T_a = 70 °C (inductive load 1.6 H) 5 kHz @ 14 W, T_a = 60 °C (lamp load) 5 kHz @ 4 W, T_a = 70 °C (lamp load)
Signal inversion	16x
Pulsetrains	No
Time triggered output	No
Signal state indication	Yes, green numeric LED per channel

[1] *Corresponds to module supply voltage minus 43 V.*

[2] *Significantly longer delays can be expected with a high-impedance load circuit.*

[3] *The specified maximum values apply to one channel. They do not apply to fast switching on multiple channels.*

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Counter	
Number of counters	0 to 4 configurable
Selectable input interfaces	Digital inputs – 24 V
Edge evaluation	4x
Edge counter including frequency reduction	No
Counter latch	Via DI (4x) Via SW (4x)
Conditional counting (gate)	Via DI (4x) Via SW (4x)
Selectable counting direction	Via DI (4x) Via SW (4x)
Frequency measurement	No
Set/reset counter	Via DI (4x) Via SW (4x)
Automatic compare function	No
Maximum input frequency	100 kHz (when the input is actively discharged) 30 kHz (without active discharge)
Module-to-module communication	
Signal propagation to neighbour	DI (8x)
Signal receiver from neighbor modules	No
Module bus interface	
System	M100
Slot type	IO (1/E, 2, 3, 4, ...31)
Module data rate	Typ.: 0 Mbit/s to 33.6 Mbit/s depending on the configuration
Bus cycle time, min.	4.5 µs [1)]

[1)] *Depending on the fieldbus used and the respective configuration, lower data rates and longer cycle times can be expected.*

Synchronization/clocks	
Distributed clocks	Yes
Time stamp format	64 bit in ns
Time resolution	10 ns
Time precision	25 ns within the station 100 ns via network (typ.) 1 µs via network (max.)
Synchronization functions	DI CNT
Synced output	Yes
Synced output jitter	±1 µs
Field bus cycle time, min.	100 µs [1)]

[1)] *Depending on the fieldbus used and the respective configuration, lower data rates and longer cycle times can be expected.*

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Diagnostics	
Electronic type plate	Yes (application interface and in the engineering tool)
Machine readable type plate	Yes (QR code with type and part information and internet link)
Environmental conditions sensor	Integrated (temperature)
Operational indications	LED "MOD" (red/green) module status LED "CH" (red/green) channel status summary Numeric LED per channel (green) digital level of the channel
Error indications	Supply voltage too low Overload Module temperature
Powerfail, logic supply	No
Powerfail, signal supply	Undervoltage < 16.8 V DC (typical)
Overload/short-circuit	Yes (totals display 8 channels)
Open circuit	No
Mismatch output readback	No
Energy supply	
Supply voltage, nominal	24 V DC
Supply voltage, range	18 V DC to 32 V DC
Supply voltage, short-term overload	40 V for 100 ms
Power consumption from 24 V signal supply	TBD
Maximum residual ripple 24 V signal supply	±2.4 V
Overcurrent protection required	No internal protection External protection with circuit breaker characteristic: B, C, D, Z or K Max. nominal current 8 A DC per group
Power dissipation, typ./max.	TBD
Reverse polarity protection signal supply	Yes, continuously (up to -32 V)
Power consumption from backplane	TBD
Supply terminal block bridge	Yes, internal connection from 1+ to 2+, and from 1- to 2-
Product safety	
Galvanic isolation	850 V AC
Galvanic isolation between inputs	No
Permitted potential difference between digital channels	40 V
Degree of protection acc. IEC 60529	IP40, terminal block IP30
Protection class acc. IEC 61010-1, IEC 61010-2-201	III
Overvoltage category acc. IEC 61010-1	II
Rated impulse withstand voltage acc. IEC 61000-4-5	Supply DC: • 500 V DM • 1000 V CM
Short-circuit protected, outputs	Thermal overload protection
Keying of terminal block	Yes (2-fold per 6 contacts)

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Environmental conditions	
Temperature range, operating	-30 °C to +70 °C [1)]
Temperature range, transport and storage	-40 °C to +85 °C
Installation altitude, max.	Up to 2000 m without temperature derating 2000 m to 4500 m: Reduction of the max. ambient temperature by 0.1 °C per 100 m elevation
Air pressure	106 kPa to 58 kPa (0 m to 4500 m)
Relative humidity, operation	Standard: 0 % to 100 % noncondensing Extended Climate: 0 % to 100 % with temporary condensation
Pollution degree acc. IEC 61010-1	Standard: 2, noncondensing Extended Climate: 2
Vibration	6 g (14.1 Hz to 500 Hz) 7.5 mm amplitude (2 Hz to 14.1 Hz) Test duration: 15 h
Shock	45 g max. (test scope 18 shocks) 20 g permanently (test scope 6000 shocks)

[1)] *Specifications apply to maximum continuous current. Higher switching losses occur at fast switching frequencies.*

Approvals/certificates	
Product safety	CE, UKCA in preparation cULus (NRAQ, NRAQ7) in preparation
Hazard area operation	ATEX: Ex II 3G Ex ec IIC Gc in preparation
Maritime	ABS, BV, ClassNK, DNV, KR, LR, RINA: in preparation
Hazardous substances and waste treatment	RoHS, RoHS China, REACH, WEEE
Quality management	ISO 9001 for development and production
Engineering	
Configuration tool	SolutionCenter (≥ V5.10)
Firmware package update	Yes (via SolutionCenter or console interface on the head module)
Mounting/installation	
Mounting type	Inserting and screwing onto the backplane with integrated M4 screw
Ground connection for protection class I	No
Dimensions	
Number of slots	1
Size unpacked W × H × D	23.3 mm × 152.5 mm × 95.7 mm
Mass unpacked	282 g

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Order data

Part type designation	Part number	Description
DIO136	00047157-00	Digital input/output module system M100 20x DI type 1/3 sink, 16x configurable DI 24V type 1/3 sink or DO type 0.5 source; 1-wire technology, filter 10 µs to 500 ms, 1 group, synchronization, 4x time stamp, 4x pulse extension, 4x oversampling, 4x counter function, module-to-module communication provider, isolated from system, without terminal block
DIO136 EC	00047159-00	Like DIO136; Extended Climate Range

Accessories

Part type designation	Part number	Description
BPR1nn	00039235-nn	Backplane for DIN-rail mounting Active backplane system M100: BPR1nn with nn = 04 to 16 slots in increments of 1, as well as 20, 24, 28, 32 slots, for DIN-rail mounting; delivery without backplane slot covers and without mounting rail
BPR1nn EC	00039236-nn	Like BPR1nn; Extended Climate Range
BPS1nn	00039237-nn	Backplane for direct screw mounting Active backplane system M100: BPS1nn with nn = 04 to 16 slots in increments of 1, as well as 20, 24, 28, 32 slots, for direct screw mounting; delivery without backplane slot covers and without screws
BPS1nn EC	00039238-nn	Like BPS1nn; Extended Climate Range
TPI100_W36_P3.45_Cgy_L1to36		Signal terminal block Completely removable terminal block, push-in spring connector for system M100, 36-way/contacts, pitch 3.45 mm, female, conductors flexible 0.2 mm² to 1.5 mm² (24 to 16 AWG), solid 0.2 mm² to 1.5 mm² (24 to 16 AWG), with wire end ferrules 0.25 mm² to 1.5 mm² (23 to 16 AWG), stripping length: 10 mm, rating: 160 V / 8 A per contact, connector color: gray, push-release: yellow, labeling: 1 to 36
TPI100_W4_P5.0_Cgy_Lsup		Supply terminal block Completely removable terminal block, push-in spring connector for system M100, 4-way/contacts, pitch 5.0 mm, female, conductors flexible 0.2 mm² to 2.5 mm² (24 to 14 AWG), solid 0.2 mm² to 1.5 mm² (24 to 16 AWG), with wire end ferrules 0.25 mm² to 1.5 mm² (24 to 16 AWG), stripping length: 10 mm, rating: 300 V / 8 A per contact, connector color: gray, push-release: yellow, labeling: 1+/1-/2+/2-
TKP106		Keying element Keying element for signal terminal blocks and supply terminal blocks TPI100 for system M100, plastic ring with 6 keying elements
TPI100_W36_W4_Set [1)]	00042499-00	Terminal block set for M100 HD modules: • 1x TPI100_W36_P3.45_Cgy_L1to36 • 1x TPI100_W4_P5.0_Cgy_Lsup • 2x TKP106

[1)] *All components of the set are also available in bulk packages.*

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